

Amendments to the English Language Translation of the Specification:

Immediately before paragraph [0001], add the following new sub-headings and text:

-- CROSS-REFERENCE TO RELATED APPLICATIONS

This is a U.S. national stage of International Application No. PCT/DE2005/000350, filed on 1 March 2005. Priority is claimed on German Application No. 10 2004 010 995.8, filed on 3 March 2004.

BACKGROUND OF THE INVENTION

1. Field of the Invention --

Immediately before paragraph [0002], add the following new sub-heading:

-- 2. Description of the Related Art --

Immediately before paragraph [0007], add the following new sub-heading:

-- SUMMARY OF THE INVENTION --

Amend paragraph [0007] as follows:

[0007] On the basis of this technical background, ~~the objective~~ an object of the invention is to make available a fuel cell that guarantees a high power output and at the same time has a structurally simple design and low developmental costs.

Amend paragraph [0008] as follows:

[0008] This ~~objective object~~ is achieved with a fuel cell ~~in accordance with Claim 1 of~~ the invention. The fuel cell is provided with a plurality of capillary tubes, each of which has an electrode. A fuel component flows through and/or against each capillary tube. The fuel cell of the invention is characterized by the fact that the capillary tubes are arranged in bundles in adjacent segments, with each bundle being located within a reaction chamber, that the electrode is led out at both ends of each capillary tube, that the electrodes of the capillary tubes of a segment are electrically connected at both ends at essentially the same potential, and that at least one wall section of each segment is provided with a counterelectrode or at least partially forms the counterelectrode.

Amend paragraph [0015] as follows:

[0015] Alternatively, there is the possibility that adjacent segments have a common separating wall. In this case, the core of the wall generally ~~consists~~ is comprised of an electrically insulating material.

Amend paragraph [0029] as follows:

[0029] In a further design modification of the fuel cell, it is provided that the segments are arranged inside a cylindrical housing and that the housing is sealed at the axial ends by cover plates through which the capillary tubes pass. In particular, it is possible for the electrodes of the capillary tubes also to be electrically connected through the cover plates. As an advantageous measure, it can be further provided that the cover plates grip the arrangement of the separating walls of the sectors and are likewise provided with separating ~~bars~~ webs. A panel that encloses

the capillary tubes of the sector below it is mounted between the separating webs. The panel can also hold separately formed walls of the sectors, e.g., against the separating webs, and the electrical connections of the counterelectrodes are led out of the sectors, preferably through the cover plates, and are likewise connected above the cover plates.

Immediately before paragraph [0033], add the following new sub-heading:

-- BRIEF DESCRIPTION OF THE DRAWINGS --

Amend paragraph [0036] as follows:

[0036] Figure 3 shows the view indicated by the arrow III in Figure 1.

Immediately before paragraph [0049], add the following new sub-heading:

-- DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS --

Amend paragraph [0050] as follows:

[0050] ~~In~~ As shown in Fig. 4 in the present case, the capillary tubes 8 have a radially inner cloverleaf profile 9, which is surrounded by a lattice-like structure as the electrode 10, which in turn is provided with a radially external catalyst 11. A radially external membrane 12 surrounds the structure of the capillary tube 8. Since the profile 9 ~~consists~~ is comprised of an electrically conductive material that supports the capillary tube 8, and this material is especially a metal, preferably titanium, the electric potential on the lattice-like structure and on the profile 9 itself can be tapped as an electrode 10 led out at both ends.

Amend paragraph [0058] as follows:

[0058] In the fuel cell 30, a plurality of ~~capillaries~~ capillary tubes 34 is again bundled in six segments 35 to 40 (see Figure 11). The capillary tubes 34, which have the same design, have a coiled core as an electrode 41. However, a tubular electrode is preferred, whose surface has a lattice-like design, is covered with a catalyst, and ~~consists of~~ includes a titanium expanded metal mesh or titanium wire cloth. Finally, the electrode is annularly surrounded by a membrane 42. In the present specific embodiment of a direct methanol fuel cell, this electrode is a cathode.

Amend paragraph [0063] as follows:

[0063] The separating wall 45 illustrated in Figure 12 is provided on both sides with identically designed counterelectrodes 46, 47 on an electrically nonconductive core 58. The counterelectrode 46 has a lattice-like mount 49 for a catalyst on a support sheet 48. This mount 49 ~~consists of~~ includes especially ~~of~~ a titanium expanded metal mesh or titanium wire cloth.

Amend paragraph [0069] as follows:

[0069] A fuel mixture ~~consisting of~~ including water and methanol is used in the fuel cell 30. This fuel mixture is fed to the reaction chambers 68, 69 of the segments through a common, closed-end feed line 66, for which purpose the feed line 66 is provided with openings 67 and forms part of the tip of each segment. The reaction chambers 68, 69 are filled with acidic methanol 70, 71 as the electrolyte. To ensure that the fuel mixture reliably enters the reaction chambers 68, 69, one pump 72, 73 for each fuel component is provided in a pump chamber 75. Whereas methanol enters the system from the outside through a pipe connection 74, the liquid

phase 65, if water (but especially water from a separately constructed tank, e.g., in a chamber 76), can be fed to the combustion process from an internal source.

Amend paragraph [0071] as follows:

[0071] A control system (~~not shown~~) 120 is provided in another chamber 77 and can adjust the ratios of the individual components of the fuel mixture, water and methanol in this case, in an optimum way by automatically controlling the pumps 72, 73.

Amend paragraph [0072] as follows:

[0072] The chambers 62, 75, 76, and 77 are placed one within the other in the manner of nested boxes and are tightened against the lower flange 33 of the housing 31 by means of an end plate 78 and, in the present case, four screws 79. The construction principle allows the addition of additional chambers or ventilators for cooling the electronics of the control system. If necessary, it is also possible to attach another fuel cell, but in this case it is necessary to provide sufficient spacing, so that air can enter the pressure chamber 60 through the opening ~~79~~ 80 in the pressure chamber housing 81.

Amend paragraph [0073] as follows:

[0073] The fuel cell 30 is designed for operation with exclusively vertically rising capillary tubes and a pressure chamber 60 at the top. Since the acidic methanol 70, 71 does not fill the reaction chambers 68, 69 as far as the cover plate 54, a free space 82, 83 is left above the acid methanol 70, 71. Gaseous reaction products, in the form of CO₂ in the present case, collect

in these free spaces ~~82, 83~~ 83, 84 and are discharged to the outside through an exhaust gas line 84 with openings 85.

Amend paragraph [0074] as follows:

[0074] As the sectional drawings according to Figures 9 and 10 also show, the exhaust gas line 84 continues the feed line 66 centrally between the adjacent tips of the segments, and the walls of the feed line 66 and of the exhaust gas line 84 constitute one of the boundaries of the reaction chambers ~~67, 68~~ 68, 69. However, no special sealing measures are necessary between the common separating walls 43, 44 and the feed line 66 and exhaust gas line 84.

Amend paragraph [0075] as follows:

[0075] In addition, level sensors ~~90 to 93~~ 91, 92, and 92', which monitor the filling level of the methanol 70, 71 in the reaction chambers 68, 69, are provided to ensure reliable operation of the fuel cell 30. Since the separating walls 43, 44 are installed without a tight seal, it is sufficient to monitor the filling level of a single reaction chamber 68. It is thus guaranteed that free spaces 83, 84 are present above the acidic methanol 70, 71 and that the filling level is sufficiently high. If one limit or the other is exceeded, the combustion process of the fuel cell is stopped.

Amend paragraph [0077] as follows:

[0077] Each separating wall 107, 108 is provided with a counterelectrode of the type explained at the beginning. The free ends of capillary tubes ~~206~~ 106 and connectors 114 of the

separating walls 107, 108 penetrate and are held by cover plates 115. This is illustrated in Figure 15, which shows a sectional drawing through a pressure chamber housing 116.

On page 16, delete the sub-heading "CLAIMS", and immediately before claim 1, add the following:

-- What is claimed is: --